

# CONSTRUCTION COMPLETION REPORT

## Area D Remedial Action Construction Completion Report, Sangamo Weston, Inc. Superfund Site (Operable Unit 1), Pickens, South Carolina

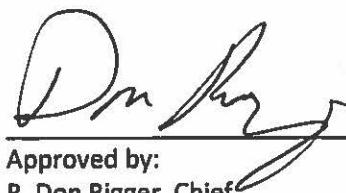
*Prepared for*

U.S. Environmental Protection Agency, Region 4,  
and South Carolina Department of Health and  
Environmental Control

June 2017



CH2M HILL Engineers, Inc.

 7/7/17

Approved by: R. Don Rigger, Chief  
Restoration & Site Evaluation Branch  
Superfund Division

**Virgilio Cocianni**

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**Schlumberger**

July 7, 2017

Mr. Craig Zeller  
Remedial Project Manager  
U.S. Environmental Protection Agency, Region 4  
61 Forsyth Street, SW  
Atlanta, GA 30303-3104

RE: Area D Removal Action Construction Completion Report  
Sangamo Weston, Inc. Superfund Site (Operable Unit 1), Pickens, South Carolina

Dear Mr. Zeller:

The subject report is enclosed for review. Should you have any questions or comments, please call me at (281) 285-4747. I can also be reached by e-mail at [cocianni-v@slb.com](mailto:cocianni-v@slb.com).

Sincerely,



Virgilio Cocianni  
Remediation Manager

Enclosure

c: Joel Padgett/South Carolina Department of Health and Environmental Control  
Dave Urann/CH2M  
Gary Foster/CH2M  
Monica Schneider/CH2M

# Contents

Section	Page
<b>Acronyms and Abbreviations .....</b>	<b>v</b>
<b>1 Introduction .....</b>	<b>1-1</b>
<b>2 Removal Action .....</b>	<b>2-1</b>
2.1 Procurement of Subcontractors .....	2-1
2.2 Mobilization .....	2-1
2.3 Site Preparation .....	2-2
2.3.1 Soil Vapor Extraction Building Relocation .....	2-2
2.3.2 Vegetation Clearing .....	2-2
2.3.3 Haul Roads .....	2-2
2.3.4 Setup of the Soil Staging and Screening Area .....	2-2
2.3.5 Preconstruction Survey and Utility Locates .....	2-2
2.3.6 Well Abandonment .....	2-2
2.3.7 Erosion and Sediment Control Measures and Water Management Controls .....	2-3
2.4 Soil Excavation .....	2-3
2.5 Transportation and Disposal .....	2-5
2.6 Infiltration Gallery Installation .....	2-5
2.7 Backfill and Site Restoration .....	2-6
2.8 Decontamination .....	2-6
2.9 Demobilization .....	2-6
<b>3 Waste Management .....</b>	<b>3-1</b>
<b>4 Implementation of Greener Cleanup Practices .....</b>	<b>4-1</b>
<b>5 References .....</b>	<b>5-1</b>

## Appendixes

A	Photographs
B	As-Built Surveys—Preconstruction, Post-Excavation, and Post-Construction
C	Water Well Records (1903 Forms)
D	Laboratory Analytical Data for Soil Waste Characterization Samples (on CD)
E	Profiles, Manifest Log, and Manifests (on CD)
F	Permit to Construct and As-Built Drawings for Injection Galleries INJ-D-01 and INJ-D-02
G	Laboratory Analytical Data for Wipe Samples (on CD)

## Table

2-1	Soil Quantities and PCB Mass Removed
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## Figures

1-1	Site Location Map
2-1	Haul Road and Location of Facilities
2-2	Well Abandonment and Injection Gallery Locations

# Acronyms and Abbreviations

CHES	Clean Harbors Environmental Service, Inc.
CH2M	CH2M HILL Engineers, Inc.
FMB	former manufacturing building
mg/kg	milligrams per kilogram
PCB	polychlorinated biphenyl
PPE	personal protective equipment
Sangamo Weston	Sangamo Weston, Inc.
site	Sangamo Weston, Inc., Superfund Site in Pickens, South Carolina
TSCA	Toxic Substances Control Act
USEPA	U.S. Environmental Protection Agency
VOC	volatile organic compound



# Introduction

This Construction Completion Report describes the soil removal activities that were performed during 2017 for Area D of the Sangamo Weston, Inc., Superfund Site located in Pickens, South Carolina (site) (Figure 1-1). The activities were associated with the removal of soil containing total polychlorinated biphenyls (PCBs) detected above the site-specific cleanup level of 25 milligrams per kilogram (mg/kg) (U.S. Environmental Protection Agency [USEPA] 1990). The removal action objective was to excavate and properly dispose of soil containing PCBs above the site-specific cleanup level of 25 mg/kg.

# Removal Action

The following subsections detail the activities that were associated with the soil excavation at Area D. The scope of work was to remove PCBs in soil above the site-specific cleanup level, as shown in the excavation plan presented in the work plan (CH2M HILL Engineers, Inc. [CH2M] 2016). Volatile organic compounds (VOCs) that were comingled with PCBs in soil above the site-specific cleanup level were also removed as a result of the soil removal activities.

The definable features of work associated with the excavation activities are as follows:

- Procurement of qualified subcontractors
- Mobilization of work crew and equipment to the Plant Site
- Site preparation, including the following:
  - Vegetative clearing in Area D work zone
  - Haul road construction and/or improvements
  - Preconstruction survey and utility locates
  - Erosion and sediment control measures and water management controls
  - Setup of the soil screening and stockpile areas (on the large concrete pads near the Former Manufacturing Building [FMB])
  - Abandonment of existing monitoring and injection wells within the planned excavation footprint in accordance with South Carolina regulations
- Soil excavation, screening, testing, staging, and disposal activities
- Infiltration gallery installation
- Backfilling/grading of excavation
- Site Restoration
- Decontamination

Photographs of the removal action are presented in Appendix A.

## 2.1 Procurement of Subcontractors

Requests for Proposals were issued for the excavation and transportation and disposal activities. Following CH2M's evaluation, Clean Harbors Environmental Service, Inc. (CHES) was selected to perform both the excavation and transportation and disposal services. TestAmerica Laboratories, Inc., was selected to provide the analytical services.

## 2.2 Mobilization

CHES began a limited mobilization in December 2016 with the full crew and equipment mobilizing to the site on January 3, 2017. Mobilization activities included development and submittal of work and health and safety plans, submittal of personnel training records, procuring material and equipment, and setting up a trailer at the FMB.

## 2.3 Site Preparation

Site preparation activities are described in the following subsections.

### 2.3.1 Soil Vapor Extraction Building Relocation

The existing equipment and piping located within the soil vapor extraction building was previously sampled for PCBs and VOCs and found to be free of detectable concentrations of these contaminants. The equipment was removed from the building and stockpiled near the FMB for future recycling or disposal at an approved landfill. The metal building was moved from Area D to another location near the FMB for use as storage prior to the mobilization of CHES. The concrete pad (former location shown in Figure 2-1) was broken up during the excavation activity and was stockpiled aboveground within the property boundary.

### 2.3.2 Vegetation Clearing

The initial activity at Area D was the clearing and grubbing of undergrowth and trees to limits necessary for excavation, access, and the stockpiling of material as detailed in the work plan (CH2M 2016). The cleared vegetation was placed outside the excavation area.

### 2.3.3 Haul Roads

Existing roads were improved by grading and placing imported stone from a local quarry. Temporary haul roads through the excavation were constructed to allow efficient traffic flow from the excavation area to the soil screening pad area (Figure 2-1). Maintenance of the haul roads occurred throughout the excavation activity.

### 2.3.4 Setup of the Soil Staging and Screening Area

The existing concrete pad was used for soil staging and screening. The McCloskey power screen and Phoenix 2100 Trommel screen were setup on and adjacent to the concrete pad. Two existing sumps located in the northeast and northwest corners of the concrete pad were uncovered. Pumps were installed at each sump with connecting hoses running to an 18,000-gallon frac tank. A flexible hose was installed from a 4-inch pump at the frac tank to the groundwater treatment facility. Figure 2-1 shows the layout of the facilities used during soil excavation and the Area D location in proximity to the layout of facilities. Additional details associated with the soil/screening pad are located in Section 2.3.7 of this report.

### 2.3.5 Preconstruction Survey and Utility Locates

The extent of the work area and excavations was staked out relative to existing global positioning system coordinates of soil boring and monitoring well locations. A preconstruction topographic survey was completed (Appendix B). A private utility locator was brought in to identify and mark underground utilities. There were no active utilities identified within the Area D excavation. Several abandoned lines were encountered and removed during the excavation activity.

### 2.3.6 Well Abandonment

Eight wells (SDMW-2, SDMW-7, SDMW-8, SD-PZ-01, SD-IW-02, SD-IW-03, SD-IW-04, and SD-IW-05) located within the planned excavation footprint were proposed for abandonment as part of the Area D soil excavation, and approved for abandonment by USEPA and the South Carolina Department of Health and Environmental Control in August 2016. The well locations are shown in Figure 2-2. The wells were abandoned in December 2016 and January 2017.

The existing injection and monitoring wells were abandoned by AE Drilling Services LLC, a licensed South Carolina driller and in accordance with Official Code of South Carolina Section R.61-71 prior to excavation. Wells were abandoned with grout composed of a Type I/II Portland cement, powdered bentonite gel, and clean water. Wells were grouted by forced injection using a tremie pipe starting at the bottom of the well and proceeding to the surface in one continuous operation. Displaced water was captured and discharged to the onsite groundwater treatment facility. Surface casing, steel well monuments, and concrete well pads were removed, and transported to the Plant Site for future disposal. The water well records (1903 Forms) documenting the well abandonment are provided in Appendix C.

### 2.3.7 Erosion and Sediment Control Measures and Water Management Controls

Erosion and sediment controls were placed around the excavation in accordance with the Stormwater Pollution Prevention Plan (CH2M 2016). Excavation was not performed below the water table; therefore, groundwater did not enter the excavation. Silt fencing and water control structures were the primary and secondary erosion and sediment control measures used and were installed downgradient of the excavations and stockpile areas following best management practices.

The screening pad had the previously breached curbs plugged with sand bags and covered with a high-density polyethylene liner to contain runoff water. The sumps located in the northeast and northwest corners of the concrete pad that had been previously backfilled were dug out to collect runoff from the concrete pad. Pumps were placed in the sumps and their discharge routed into a 18,000-gallon frac tank located adjacent to the northeast corner of the pad. The frac tank contained weirs to allow sediment to settle before being periodically pumped to the concrete equalization basin where it was treated by the existing groundwater treatment system and discharged under the existing National Pollutant Discharge Elimination System permit (Permit No. SC0046612). Sixty-mil high-density polyethylene liner was placed under the frac tank and Trommel screen, both of which were located off the screening pad.

The Stormwater Pollution Prevention Plan was adhered to such that erosion and sediment control measures and water management controls met the substantive requirements of the South Carolina National Pollutant Discharge Elimination System General Permit for Stormwater Discharges from Construction Activities. Best management practices were implemented during all phases of the work to ensure that proper erosion control measures were in place and maintained.

## 2.4 Soil Excavation

The excavation limits are shown on the post-excavation as-built survey (Appendix B). Soil was excavated in a series of targeted excavations, beginning with shallow excavations and continuing with sequentially deeper excavations. Soil excavation was accomplished with a Cat 336 (or equivalent) hydraulic excavator in lifts and loaded into 25- and 30-cubic-yard off-road dump trucks. Personal air monitoring, perimeter air monitoring, and stockpile air monitoring were conducted during the excavation and backfill activities in accordance with the work plan (CH2M 2016).

The soil conditions allowed the excavations to occur on 1:1 sideslope geometries, which were confirmed by CHES's designated competent person.

Soil and rock were removed from the excavations reaching a maximum depth of 58 feet below grade. Excavated material was transported to the soil stockpile area at the screening pad and placed in a stockpile for feeding to the screens. Each stockpile of soils was then mechanically screened as described in the following paragraphs and moved to a discrete screened stockpile area, labeled, and sampled for PCBs and VOCs.

Mechanical screening was performed in a 2-step process of initial vibratory screening through a McCloskey 150 screening plant to remove rock and debris greater than 4 inches and then through a

PowerScreen Phoenix 2100 Trommel screen set up with 1-inch screens. Screen-rejected stone and rock greater than 1 inch diameter were placed in a stockpile area on the pad. A second screening of the stockpiled stone and rock took place after which the screened stone and rock was hauled to Area D for reuse as excavation backfill or stockpiled aboveground within the property boundary. The screenings were placed in stockpiles of less than 500 cubic yards for sampling and analysis to determine the disposal location.

The screened soil stockpiles were managed based on waste characterization results. The soil waste characterization results are provided in Appendix D. The decision logic that determined the soil management, characterization, transportation, and disposal (or reuse as backfill) is presented in Figure 2-4 of the work plan (CH2M 2016).

- Toxic Substances Control Act (TSCA)-regulated soil: Soil with PCB concentrations greater than or equal to 50 mg/kg and VOC concentrations less than the hazardous waste toxicity criteria (40 *Code of Federal Regulations* Part 261 Subpart C) were transported offsite to one of two property permitted TSCA-regulated disposal facilities (CHES' Lone Mountain, Oklahoma, facility and Waste Management Inc.'s Emelle, Alabama, facility).
- Non-TSCA-regulated soil: Soil with PCB concentrations from 25 mg/kg to less than 50 mg/kg and VOC concentrations less than the hazardous waste toxicity criteria (40 *Code of Federal Regulations* Part 261 Subpart C) were temporarily stockpiled at the lower concrete pad at the end of the screening pad and disposed of at Republic Services' Union County Landfill at 898 Wildcat Road, Enoree, South Carolina, an approved Subtitle D nonhazardous facility.
- Reused soil: Soils with PCB concentrations of less than the site-specific cleanup level (25 mg/kg) were viable for reuse as backfill material. Stockpile characterization PCB concentrations for soil used as backfill were 11.3 mg/kg or less. Excavated soil with stockpile characterization PCB concentrations between 11.4 mg/kg and 25 mg/kg were disposed of at Republic Services' Union County Landfill at 898 Wildcat Road, Enoree, South Carolina, an approved Subtitle D nonhazardous facility.

Table 2-1 details the volumes of TSCA-regulated soil, Non-TSCA-regulated soil, soil below cleanup criteria, and rock removed from the excavation, as well as the estimated PCB mass removed and disposed of offsite in accordance with applicable regulations. The VOC mass removed was not quantified since stockpile samples were collected after screening, which may bias the mass removed low. The VOC concentrations in the stockpiled soil following screening were not detected or were low-level detections.

**Table 2-1. Soil Quantities and PCB Mass Removed**

*Area D Removal Action Construction Completion Report,  
Sangamo Weston, Inc. Superfund Site (Operable Unit 1), Pickens, South Carolina*

Description	Quantity (tons)	Estimated PCB Mass Removed (lbs)
TSCA-regulated Soil Removed	13,920	6,541
Non-TSCA-regulated Soil Removed	2,782	
Soil Used as Backfill	2,090	N/A
Stone Removed	2,902	

Notes:

lbs = pounds

N/A = not applicable

## 2.5 Transportation and Disposal

The Traffic Control Plan that was instituted provided site access from the east via the Sangamo Road main gate, which served as the entry access point for subcontractors, vehicles, and equipment. In accordance with our proposed plan, after characterization of the screened excavated soil, it was placed into TSCA-regulated and Non-TSCA-regulated loadout stockpiles on the processing pad. Once the waste was accepted by the disposal facility(ies), disposal trucks were loaded to transport the soil offsite to the disposal facility(ies).

Prior to loading, each truck was inspected for Department of Transportation compliance and cleanliness. Upon approval, each vehicle was moved into the pre-loading area for trailer bed inspection and liner installation. Trucks were directed to the onsite portable scale to obtain their tare weight before going to the loading area. Once loaded, the trucks were dry-brush decontaminated and then returned to the onsite portable scales to identify their weight as loaded. Manifest forms were provided to the drivers, tarping/load covers were secured, and final inspection occurred before leaving the site. Trucks were monitored as they left the site to minimize soil tracked onto surrounding roadways, were closely scheduled, and were not allowed to park on Sangamo Road.

Transportation and disposal was accomplished in one of the following three ways:

- TSCA-regulated soil—A total of 365 loads of 22-ton dump trailers were loaded and transported to Anderson, South Carolina, where they were transloaded into lined hopper rails cars, sealed, and transported to CHES' Lone Mountain, Oklahoma, facility for disposal (Appendix E-1). A total of 73 railcars totaling 7,017.52 tons of TSCA-regulated soils was transported by rail.

Because of the larger than expected volume of TSCA soils, an additional 6,902.27 tons of TSCA soil was loaded into 295 dump trailers, which traveled to Waste Management Inc.'s Emelle, Alabama, facility for disposal (Appendix E-2).

A total of 13,919.79 tons of TSCA-regulated soils was transported offsite and disposed of at these facilities.

- Non-TSCA-regulated soil—A total of 128 loads carrying 2,781.68 tons was approved for disposal and transported by truck to Republic Services' Union County Landfill at 898 Wildcat Rd, Enoree, South Carolina (Appendix E-3).

Manifest logs are provided in Appendix E identifying all TSCA-regulated and non-TSCA regulated wastes that left the site. Copies of the manifests are included on a CD, which accompanies this report. The total volume of TSCA-regulated and non-TSCA regulated shipped offsite for disposal was 16,701.47 tons, resulting in approximately 6,541 pounds of PCB mass removed from the site as a result of this action.

## 2.6 Infiltration Gallery Installation

Prior to backfilling the Area D excavations, an underground injection control permit to construct (No. SCHE03020417M5) was obtained from the South Carolina Department of Health and Environmental Control to install up to three infiltration galleries (Appendix F). Two infiltration galleries were installed, and the locations are shown in Figure 2-2.

The as-built drawings for the infiltration galleries are provided in Appendix F. The injection galleries consist of horizontal slotted well screens installed in the bottom of the two deepest excavations to allow for delivery of liquid reagents (such as permanganate solutions) to the subsurface for treatment of VOCs remaining in soil and groundwater below the excavations.

The injection galleries consist of a 4-inch-diameter schedule 80 polyvinyl chloride pipe with saw-cut 40-slot (0.040-inch) well screen openings. The slots were cut on only one side of the pipe, and oriented

with slots facing upward to ensure distribution across the entire pipe during reagent delivery. Several small weep holes were drilled into the bottom-facing side of the pipe to allow the pipe to drain after reagent delivery events. The slotted pipe was covered by an 8-ounce non-woven geotextile to help prevent fine soils from entering the screen. Approximately 1 foot of the backfill stone (obtained during the soil screening process) and purchased #57 stone were placed under and over the pipe before backfilling the excavation with soil. A cap was placed on one end of the horizontal infiltration pipe and a solid riser pipe extending vertically to the ground surface on the opposite end. The infiltration pipes were completed at the surface with an abovegrade steel protective casing and concrete pad (2 feet by 2 feet by 6 inches thick) and identified as INJ-D-01 and INJ-D-02.

## 2.7 Backfill and Site Restoration

Consistent with the Record of Decision and the Area of Contamination Policy, the excavation was backfilled using soil stockpiles that were determined to be suitable for backfill if the analytical results for PCBs indicated a concentration of less than the site-specific cleanup level of 25 mg/kg. However, the only soil that was used for backfilling had a PCB concentration of less than 11.3 mg/kg. Stockpiled rock and stone were only placed around the infiltration galleries, followed by soil and topsoil in approximately 24-inch lifts and generally compacted with excavation equipment. No imported materials were used during the backfilling activity, other than the imported stone around the infiltration galleries. The surrounding area was graded as shown in the post-construction as-built survey (Appendix B). Once the excavations were backfilled and graded, the disturbed areas were reseeded with native species for erosion and sediment control. The reseeded efforts support the USEPA greener cleanup and pollinator protection initiatives encouraged by USEPA (see Section 4).

## 2.8 Decontamination

Heavy equipment that was in contact with the site contaminated soils was decontaminated and wipe sampled prior to leaving the site. The decontamination activities were conducted at the processing pad in order to capture and contain any solids and liquids generated during the decontamination process. Dry decontamination of the equipment was performed to remove any heavy soil residues, followed by use of hot pressure washers. Small quantities of nontoxic biodegradable detergents were also used for the fine cleaning of the equipment, followed by a clean water rinse. The equipment was cleaned to a free-release wipe-test criterion of 10 micrograms per 100 square centimeters or less PCBs [Title 40 *Code of Federal Regulations* 761.79(b)(3)(i)(A)]. Wipe-test samples were submitted to a South Carolina-certified laboratory and analyzed for PCBs by USEPA SW-846 Method 8082A. The results of the wipe testing are included in Appendix G.

As a result of previous experience with screening belts, the conveyor belts on both soil screening units were removed and disposed of as TSCA-regulated waste. Additionally, engine and cabin air filters of all motorized equipment operating in the exclusion zone were replaced prior to demobilization.

After equipment was removed from the screening pad, the pad was pressure-washed and wipe-tested to ensure that all residuals had been removed. The pad's perimeter breaches were then unsealed, and the collection sumps were filled.

## 2.9 Demobilization

Following site restoration, the following demobilization activities were conducted in accordance with the work plan (CH2M 2016):

- Cleaned and removed equipment and materials from the excavation and staging areas.
- Removed all temporary construction features such as fencing, cones, barricades, and flagging.

- Properly disposed of solid waste at an appropriate disposal facility.
- Removed portions of the erosion and sediment control measures. Silt fencing was left in place around the excavation area while site vegetation was being reestablished.
- Conducted a final inspection.



# Waste Management

The following waste streams were associated with this removal action and were disposed of according to sampling results:

- TSCA-regulated and non-TSCA-regulated excavated soil
- Equipment decontamination water
- Contaminated debris, including personal protective equipment (PPE), plastic sheeting, and disposable sampling equipment
- Miscellaneous trash that had not come in contact with contaminated media

Excavated soil was stockpiled and managed as described in Section 2.4. The soil was placed in piles less than approximately 500 cubic yards for sampling, analysis, and characterization. Laboratory reports containing soil stockpile characterization results are provided in Appendix D. The following samples were collected for waste characterization and offsite disposal purposes:

- A 10-point composite representative sample was collected from each stockpile and analyzed for PCBs by USEPA Method 8082A.
- A grab sample was collected from each stockpile and analyzed for VOCs by USEPA Method 8260B.

Soil transported and disposed of offsite was properly profiled and characterized for offsite disposal, as described in Section 2.4. Soil with PCB concentrations less than 11.3 mg/kg and VOC concentrations less than the hazardous waste toxicity criteria was used as backfill material.

Characterization and profiling was performed in accordance with disposal facility requirements. The analytical results were sent to the disposal facilities for acceptance and approval. Copies of the profiles for each of the disposal facilities are included in Appendix E (Appendix E-4). Following acceptance, the soil was loaded onto trucks at the site and transported to the appropriate disposal facilities via rail and truck.

The depth of the excavation remained above the water table. As such, the only water encountered at the excavation was rainwater and that water was routed via excavation sloping and water control structures to an area away from the active excavation where it was absorbed into the ground eliminating the need for pumping. Rainwater from the stockpile area and equipment decontamination water flowed to the sumps at the northeast and northwest corners of the concrete pad where it was pumped into an 18,000-gallon frac tank followed by discharge to the concrete equalization at the onsite groundwater treatment system.

Treated groundwater from the groundwater treatment system was used for decontamination, dust control, and rinse water.

All PPE was placed in plastic garbage bags and disposed of offsite with the TSCA-regulated soil.

# Implementation of Greener Cleanup Practices

During the planning and implementation of the Area D removal action, greener cleanup practices were implemented, as practical, to achieve sustainable remediation principles for greener cleanups encouraged by USEPA (ASTM 2016; USEPA 2013). Successful implementation of greener cleanup practices during this removal action include the following:

- **Site Layout**—The site layout was designed to provide a continuous flow of excavated materials from the excavation through the screening process and into stockpiles for sampling with minimal double handling of materials, saving energy, cost, and equipment operating time.
- **Railcar Transport**—Shipping approximately 7,020 tons by railcar saved approximately 750 roundtrip truck miles per load on 365 truckloads as compared to full truck transport to Emelle, Alabama, or a total of 273,750 truck miles. On average, rail transport is four times more fuel efficient than trucks, which directly relates to the lowering of greenhouse gas emissions by 75 percent (Association of American Railroads 2017).
- **Transport Routes**—Transport routes through the site were designed to allow the trucks a continuous flow from the staging/lining area to the loading area, across the scales, to the tarping station and offsite, thus minimizing unnecessary mileage and idling onsite.
- **Onsite Scales**—Full-size deck scales were brought onsite to ensure that each truck was loaded to the maximum allowed transport weight and therefore maximum efficiency. Scales eliminated under-loaded as well as illegally over-loaded trucks.
- **Separation of Rock**—Rock and cobble greater than 1 inch were mechanically screened out, first in a vibrating deck screen to remove the large (greater than 4-inch diameter) rock, then through a rotary screen. The result was 2,902 tons of rock removed, which did not require loading, transport, and disposal offsite. Based on the ratio of the waste (80 percent TSCA and 20 percent non-TSCA disposal), this screening took over 120 semi-trucks off the road and saved over 80,000 truck miles based on roundtrip distances to Emelle, Alabama, and Republic Services landfills.
- **Phased loading of transport vehicles**—Transport vehicles for loading were scheduled to minimize idle time and prevent backup of trucks.
- **Buy Locally**—Every effort was made to buy project supplies locally to support the local community whenever possible.
- **Best management practices for land and ecosystems**—Through the application of our Valuing Nature practice, we identified an opportunity to create ecological value at the site, post-remedy, by seeding the area with a native seed mix that will produce a plant community that will be attractive to birds (specifically quail) and pollinators. This will create a more biodiverse and valuable ecosystem than the typical approach of seeding areas with one or two non-native fast-growing grass species. The seed mix was specifically designed for the site geography and included partridge pea, Virginia wildrye, bigtop lovegrass, slender lespedeza, beaked panicgrass, deertongue, switchgrass, blackeyed susan, little bluestem, butterfly milkweed, showy goldenrod, indiagrass, and purpletop. The mix will provide food into the fall and cover throughout the year. A cover crop of grain oats and brown-top millet was also seeded to quickly hold the ground and prevent erosion. While not native, the cover crop also produces seed that is valuable to wildlife. We are currently in the process of determining the timing of mowing to help create and maintain a biodiverse plant community. This

focused effort to increase habitat for pollinators aligns with USEPA's pollinator protection plan (Pollinator Health Task Force 2015).

# References

Association of American Railroads. 2017. *The Environmental Benefits of Moving Freight by Rail*. March.

ASTM International. 2016. Standard Guide for Greener Cleanups ASTM E2893 - 16e1.

CH2M HILL Engineers, Inc. (CH2M). 2014. *Annual Report, Period April 2013 to March 2014, Sangamo Weston, Inc./Twelvemile Creek/Lake Hartwell PCB Contamination Superfund Site (Operable Unit 1), Plant, Breazeale, and Cross Roads Sites, Pickens, South Carolina*. July.

CH2M HILL Engineers, Inc. (CH2M). 2016. *Area D Removal Action Work Plan. Sangamo Weston, Inc. Superfund Site (Operable Unit 1), Pickens, South Carolina*. October.

Pollinator Health Task Force. 2015. *National Strategy to Promote the Health of Honeybees and Other Pollinators*. The White House, Washington DC. May 19.

U.S. Environmental Protection Agency (USEPA). 1990. *Record of Decision-Remedial Alternative Selection, Sangamo Weston/Twelve-Mile Creek/Lake Hartwell PCB Contamination, Operable Unit #1*. December.

U.S. Environmental Protection Agency (USEPA). 2013. *Encouraging Greener Cleanup Practices through Use of ASTM International's Standard Guide for Greener Cleanups*. Office of Solid Waste and Emergency Response. December 23.

# Professional Certification

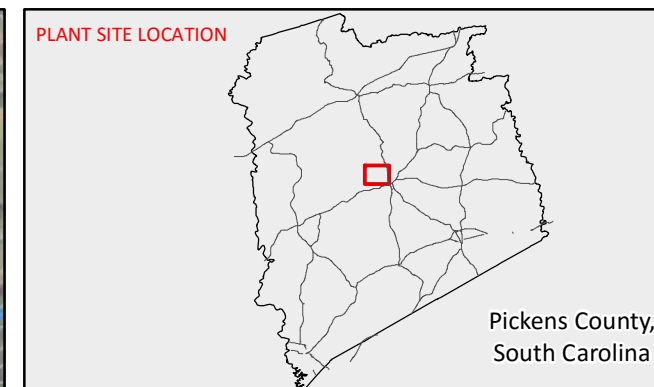
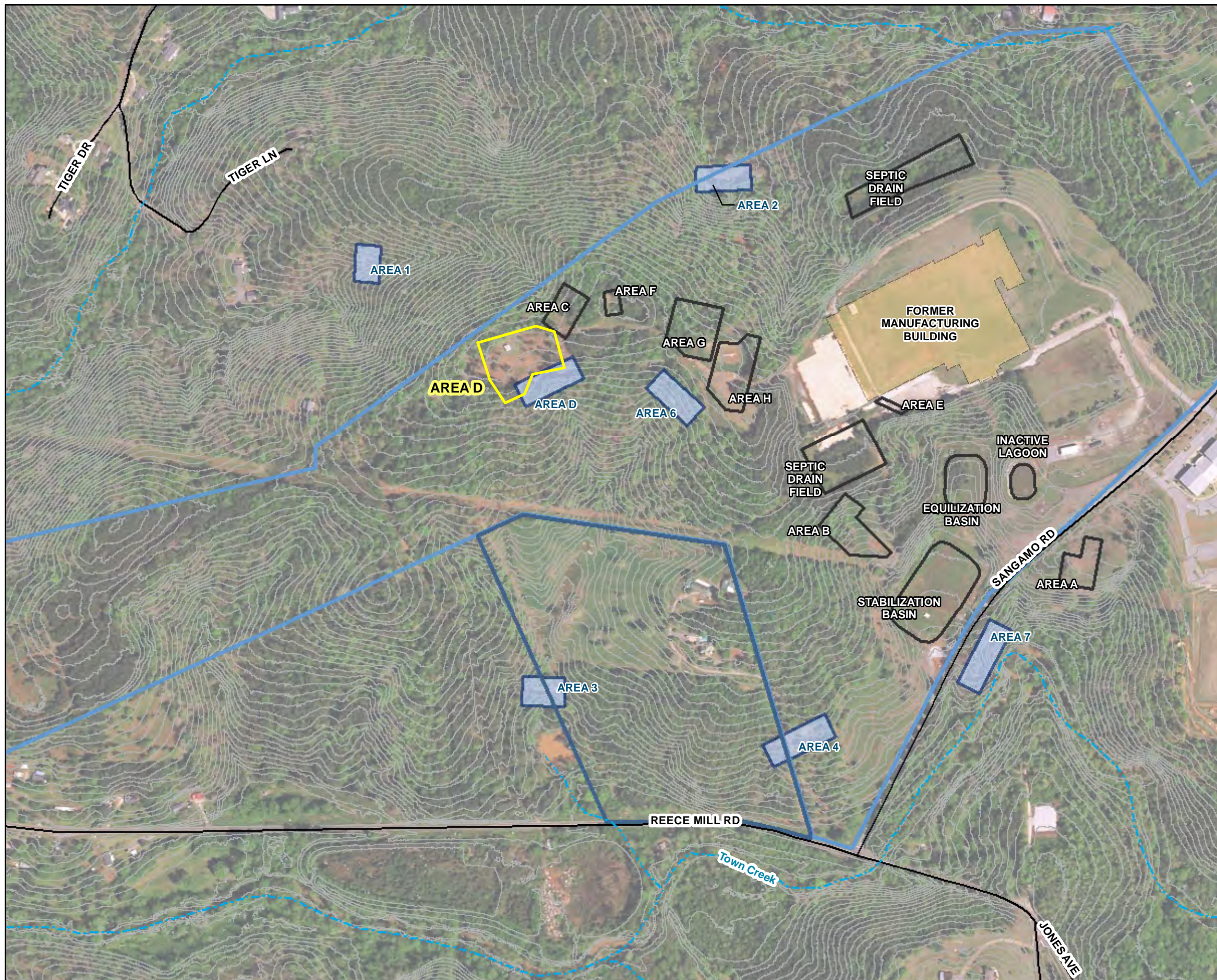
I, Dean Williamson, South Carolina Professional Engineer No. 21428, certify that I currently hold an active license in the State of South Carolina, and the enclosed Area D Removal Action Construction Completion Report dated June 2017, for the former Sangamo Weston, Inc. Plant Site, Pickens, South Carolina, was prepared under my responsible charge.

A handwritten signature in black ink, appearing to read "Dean Williamson", written over a horizontal line.

Dean Williamson, P.E.  
South Carolina Professional Engineer No. 21428  
CH2M HILL Engineers, Inc.  
3011 SW Williston Road  
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Tel. 352-359-5670

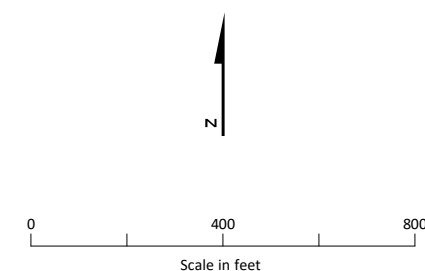
Figures





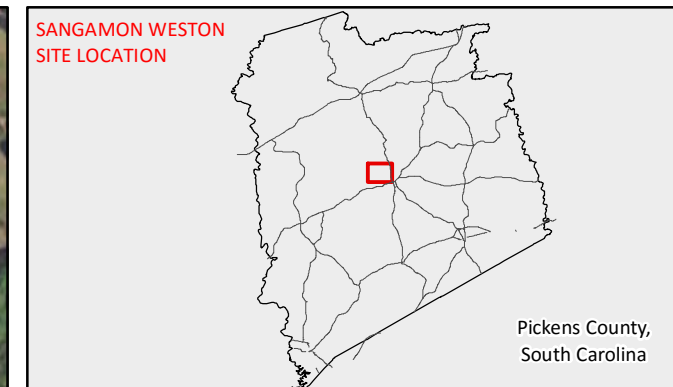
- LEGEND**
- ~ River or Creek
  - ~ 5' Topographic Contour
  - Highway or Local Road
  - Remedial Investigation Area D
  - Remedial Investigation Area
  - Groundwater Recovery Area
  - Former Manufacturing Building Footprint
  - Moore Property Boundary
  - Schlumberger Property Boundary

**Data Sources:**  
**Basemap:** USDA, Farm Service Agency (FSA), National Agriculture Imagery Program (NAIP), 2015  
**Contours:** South Carolina Department of Natural Resources, Digital Elevation Model (DEM), 2011  
**Streams:** USGS, National Hydrography Dataset (NHD), 1999



**FIGURE 1-1**  
**Site Location Map**  
 Area D Removal Action Construction Completion Report  
 Sangamo Weston Site, Pickens, South Carolina





#### LEGEND

- Former SVE Building and Concrete Pad
- - - Screening Pad Area
- - - Existing Road
- Off Road Truck Route
- Water Transfer Line
- Testing Pile

#### Notes:

TSCA = Toxic Substances Control Act  
SVE = Soil Vapor Extraction

**Basemap Source:**  
USDA, Farm Service Agency (FSA), National  
Agriculture Imagery Program (NAIP), 2015  
**Note:** Features are approximate.

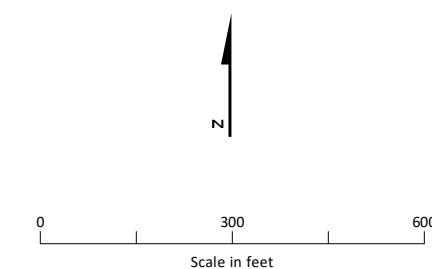
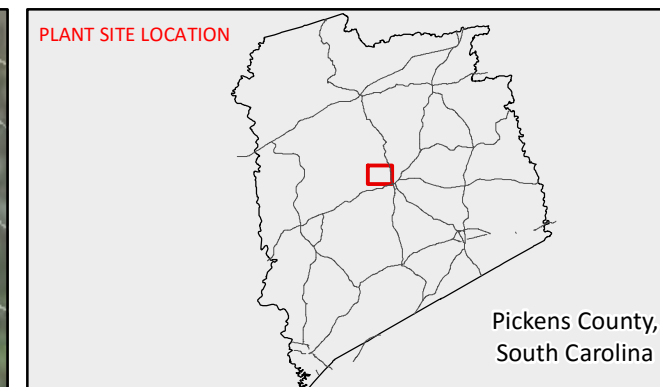


FIGURE 2-1  
**Haul Road and Location of Facilities**  
Area D Removal Action Construction Completion Project  
Sangamo Weston Site, Pickens, South Carolina

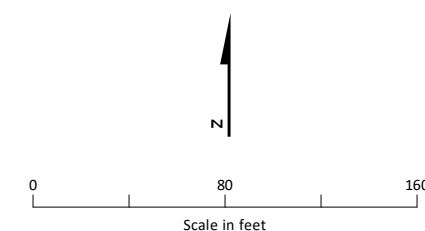




#### LEGEND

- Abandoned Monitoring Well
- ~ 5' Topographic Contour
- ▭ Schlumberger Property Boundary
- ▭ Remedial Investigation Area
- ▭ Groundwater Recovery Area
- Injection Gallery

**Data Sources:**  
**Basemap:** USDA, Farm Service Agency (FSA), National Agriculture Imagery Program (NAIP), 2015  
**Contours:** South Carolina Department of Natural Resources, Digital Elevation Model (DEM), 2011  
**Streams:** USGS, National Hydrography Dataset (NHD), 1999



**FIGURE 2-2**  
**Well Abandonment and Injection Gallery Locations**  
 Area D Removal Action Construction Completion Project  
 Sangamo Weston Site, Pickens, South Carolina



## Appendix A

### Photographs

# Photographs



*View of Area D looking west following clearing activity*



*View of Area D excavation at east end with perimeter silt fencing in the foreground*





*View of screening and processing pad looking towards the south*



*View of screening activities at the processing pad*





*View of TSCA material loadout operation*



*View of railcar unloading ramp*





*View of Area D excavation looking east*



*View of Area D excavation progressing towards the deeper PCB removal areas*





*View of the Area D excavation where the deepest PCB contamination was identified*



*Area D excavation continuing at the deepest PCB location*





*View showing the final excavation at the location of the deepest PCB contamination*



*Infiltration gallery INJ-D-02 installation*





*Placement of stone on top of the INJ-D-02 infiltration gallery piping*



*View of backfilling activity at injection gallery INJ-D-02*





*View of screened rock stockpile located west of Area D excavation*



*View of Area D finished grading looking west*





*Hydroseeding of Area D looking east*

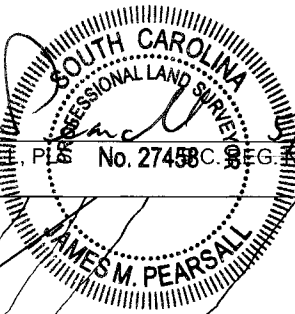


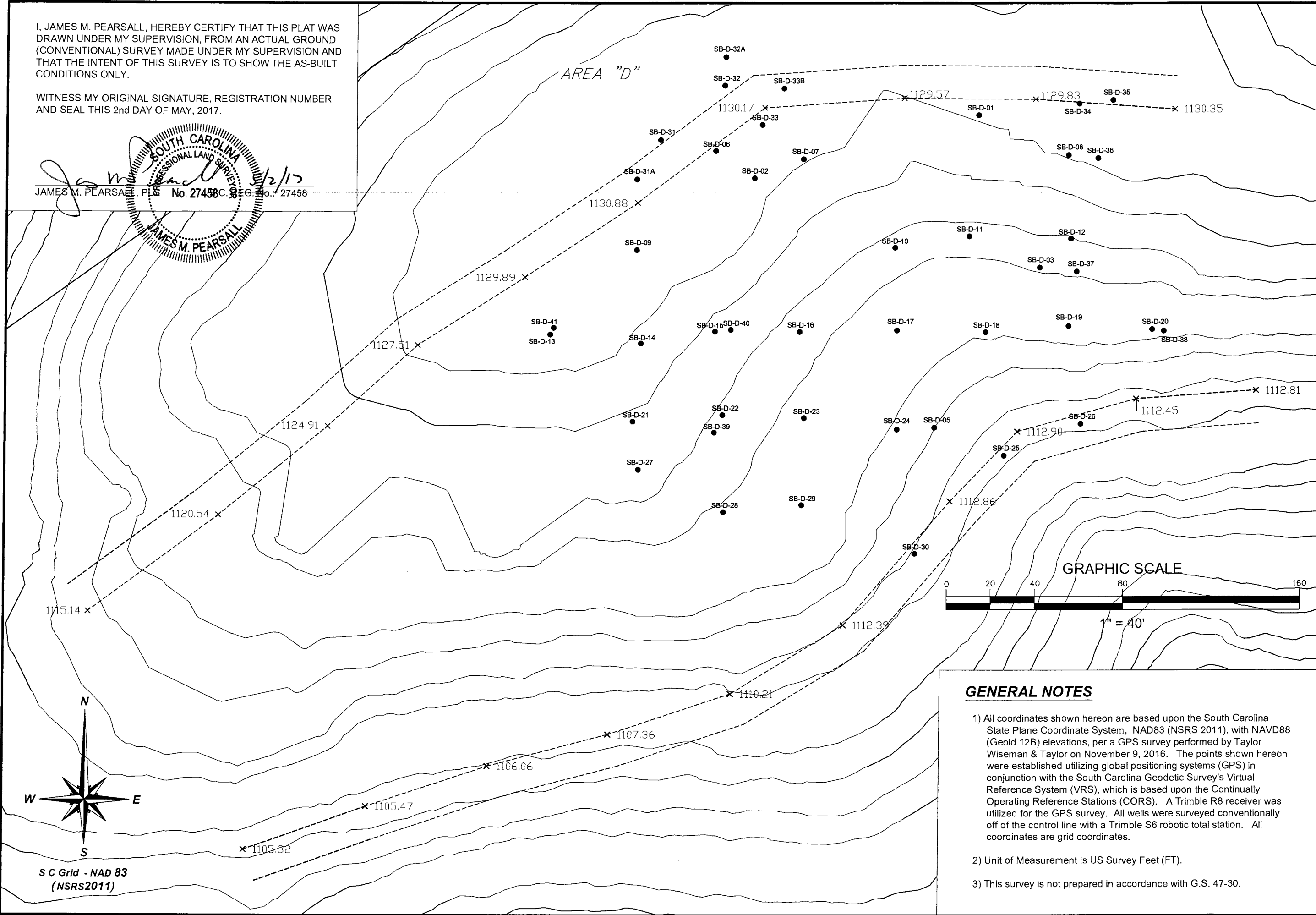
*View of Area D looking west showing growth from hydroseeding activity*

Appendix B  
As-Built Surveys—Preconstruction,  
Post-Excavation, and  
Post-Construction

I, JAMES M. PEARSALL, HEREBY CERTIFY THAT THIS PLAT WAS DRAWN UNDER MY SUPERVISION, FROM AN ACTUAL GROUND (CONVENTIONAL) SURVEY MADE UNDER MY SUPERVISION AND THAT THE INTENT OF THIS SURVEY IS TO SHOW THE AS-BUILT CONDITIONS ONLY.

WITNESS MY ORIGINAL SIGNATURE, REGISTRATION NUMBER AND SEAL THIS 2nd DAY OF MAY, 2017.

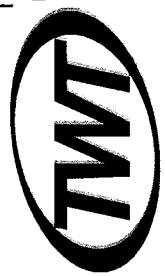
  
JAMES M. PEARSALL, PLS No. 27458 REG. No.: 27458



**GENERAL NOTES**

- 1) All coordinates shown hereon are based upon the South Carolina State Plane Coordinate System, NAD83 (NSRS 2011), with NAVD88 (Geoid 12B) elevations, per a GPS survey performed by Taylor Wiseman & Taylor on November 9, 2016. The points shown hereon were established utilizing global positioning systems (GPS) in conjunction with the South Carolina Geodetic Survey's Virtual Reference System (VRS), which is based upon the Continually Operating Reference Stations (CORS). A Trimble R8 receiver was utilized for the GPS survey. All wells were surveyed conventionally off of the control line with a Trimble S6 robotic total station. All coordinates are grid coordinates.
- 2) Unit of Measurement is US Survey Feet (FT).
- 3) This survey is not prepared in accordance with G.S. 47-30.

**TAYLOR WISEMAN & TAYLOR**  
ENGINEERS SURVEYORS SCIENTISTS  
SUBSURFACE UTILITY ENGINEERS  
700 FOREST POINT CIRCLE, SUITE 116  
CHARLOTTE, NC 28273  
PHONE (704) 527-2535 FAX (704) 527-2537  
NORTH CAROLINA LICENSE NUMBER: F-0862

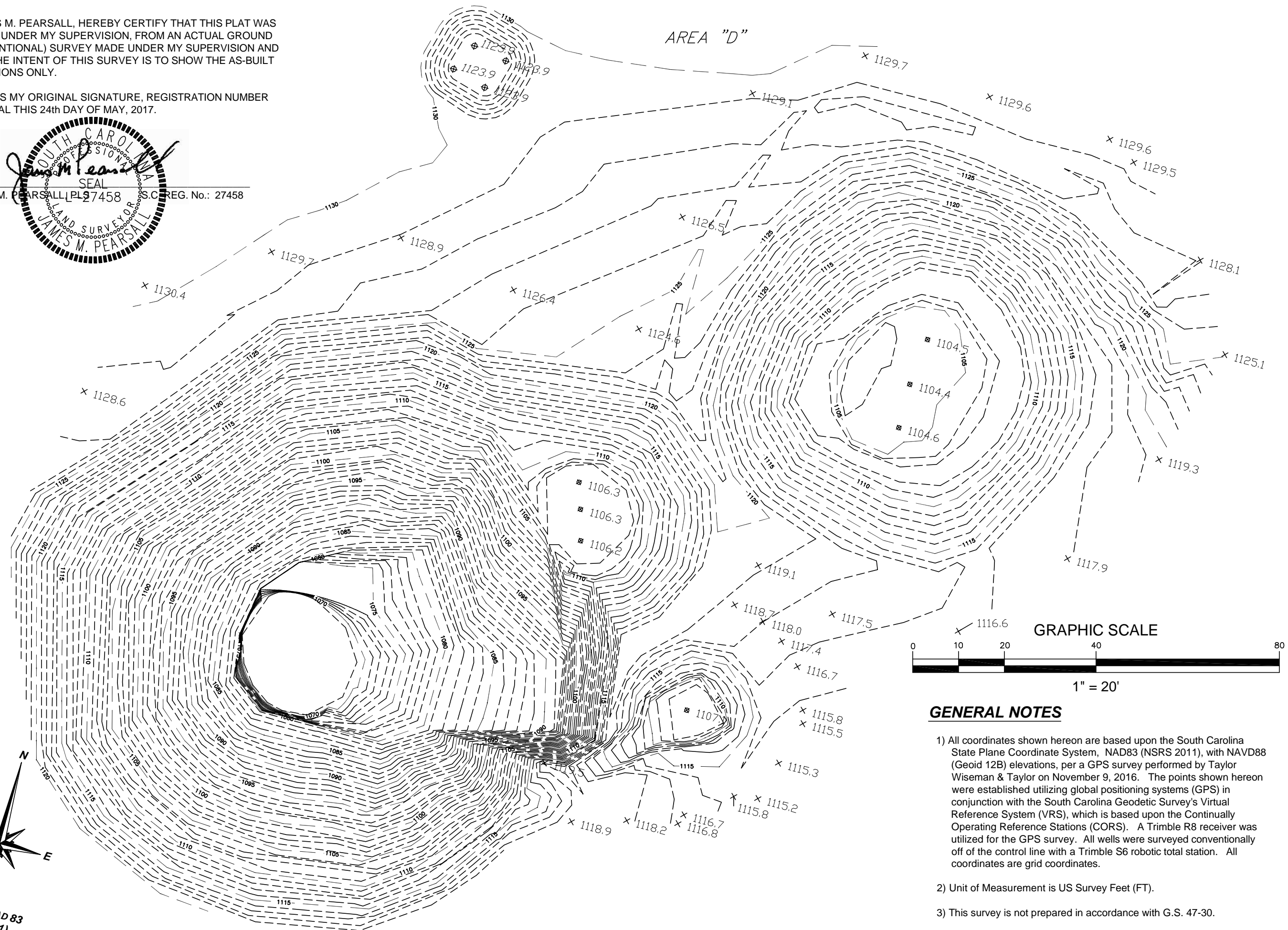


**Pre CONSTRUCTION ASBUILT SURVEY**  
for CLEAN HARBORS ENVIRONMENTAL SERVICES  
**SCHLUMBERGER TECHNOLOGY CORPORATION**  
SANGAMO FACILITY  
PICKENS COUNTY - PICKENS, NC

REVISIONS:	
DATE OF SURVEY:	05/02/2017
SCALE:	1" = 40'
DRAWN BY:	JMP
CHECKED BY:	VKW
PROJECT:	06338.5000.00
SHEET:	1 / 1



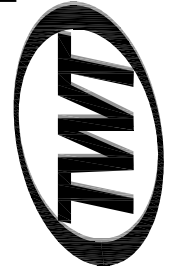
WITNESS MY ORIGINAL SIGNATURE, REGISTRATION NUMBER  
AND SEAL THIS 24th DAY OF MAY, 2017.



1) All coordinates shown hereon are based upon the South Carolina State Plane Coordinate System, NAD83 (NSRS 2011), with NAVD88 (Geoid 12B) elevations, per a GPS survey performed by Taylor Wiseman & Taylor on November 9, 2016. The points shown hereon were established utilizing global positioning systems (GPS) in conjunction with the South Carolina Geodetic Survey's Virtual Reference System (VRS), which is based upon the Continually Operating Reference Stations (CORS). A Trimble R8 receiver was utilized for the GPS survey. All wells were surveyed conventionally off of the control line with a Trimble S6 robotic total station. All coordinates are grid coordinates.

- 2) Unit of Measurement is US Survey Feet (FT).
- 3) This survey is not prepared in accordance with G.S. 47-30.

**TAYLOR WISEMAN & TAYLOR**  
ENGINEERS ■ SURVEYORS ■ SCIENTISTS  
SUBSURFACE UTILITY ENGINEERS  
700 FOREST POINT CIRCLE, SUITE 116  
CHARLOTTE, NC 28273  
PHONE (704) 527-2535 FAX (704) 527-2537  
NORTH CAROLINA LICENSE NUMBER: F-0362



**POST EXCAVATION ASBUILT SURVEY**  
for CLEAN HARBORS ENVIRONMENTAL SERVICES  
**SCHLUMBERGER TECHNOLOGY CORPORATION**  
**SANGAMO FACILITY**  
PICKENS COUNTY - PICKENS, NC

REVISIONS:

DATE OF SURVEY:	05/24/2017
-----------------	------------

SCALE: 1" = 20'

DRAWN BY: JMP

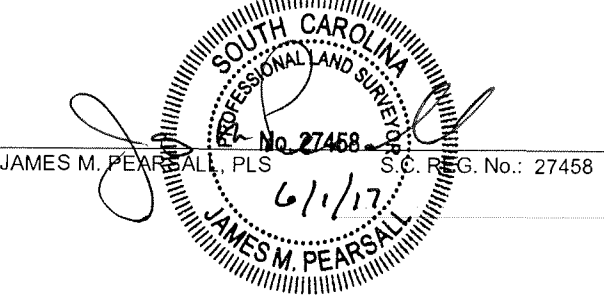
CHECKED BY: VKW

PROJECT:	06338.5000.00
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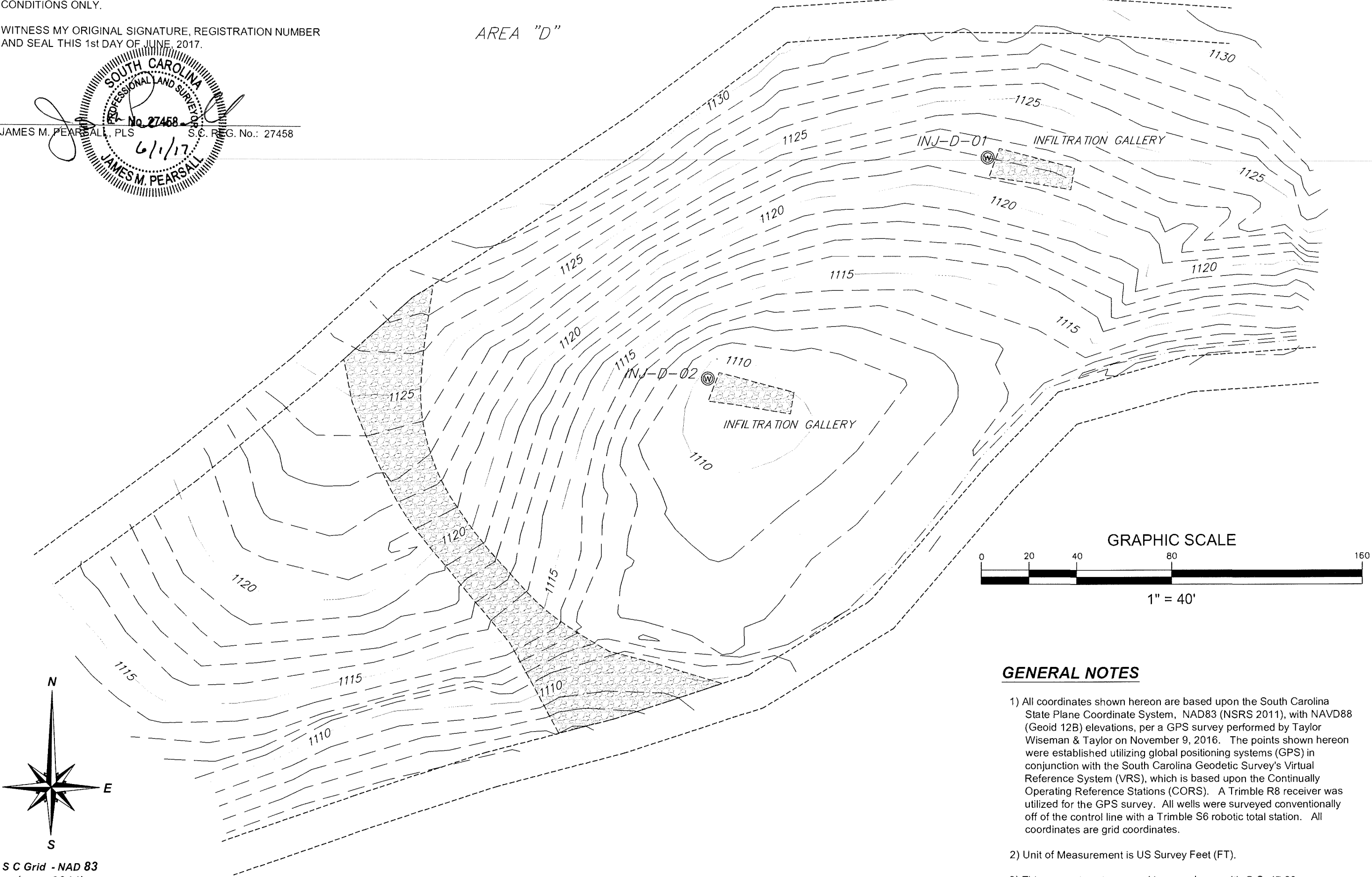
SHEET: 1 / 1

I, JAMES M. PEARSALL, HEREBY CERTIFY THAT THIS PLAT WAS DRAWN UNDER MY SUPERVISION, FROM AN ACTUAL GROUND (CONVENTIONAL) SURVEY MADE UNDER MY SUPERVISION AND THAT THE INTENT OF THIS SURVEY IS TO SHOW THE AS-BUILT CONDITIONS ONLY.

WITNESS MY ORIGINAL SIGNATURE, REGISTRATION NUMBER AND SEAL THIS 1st DAY OF JUNE, 2017.



AREA "D"



**GENERAL NOTES**

- 1) All coordinates shown hereon are based upon the South Carolina State Plane Coordinate System, NAD83 (NSRS 2011), with NAVD88 (Geoid 12B) elevations, per a GPS survey performed by Taylor Wiseman & Taylor on November 9, 2016. The points shown hereon were established utilizing global positioning systems (GPS) in conjunction with the South Carolina Geodetic Survey's Virtual Reference System (VRS), which is based upon the Continually Operating Reference Stations (CORS). A Trimble R8 receiver was utilized for the GPS survey. All wells were surveyed conventionally off of the control line with a Trimble S6 robotic total station. All coordinates are grid coordinates.
- 2) Unit of Measurement is US Survey Feet (FT).
- 3) This survey is not prepared in accordance with G.S. 47-30.

**TAYLOR WISEMAN & TAYLOR**  
ENGINEERS ■ SURVEYORS ■ SCIENTISTS  
SUBSURFACE UTILITY ENGINEERS  
700 FOREST POINT CIRCLE, SUITE 116  
CHARLOTTE, NC 28273  
PHONE (704) 527-2535 FAX (704) 527-2537  
NORTH CAROLINA LICENSE NUMBER: F-0362



**POST CONSTRUCTION ASBUILT SURVEY**  
for CLEAN HARBORS ENVIRONMENTAL SERVICES  
**SCHLUMBERGER TECHNOLOGY CORPORATION**  
**SANGAMO FACILITY**  
PICKENS COUNTY - PICKENS, NC

REVISIONS:

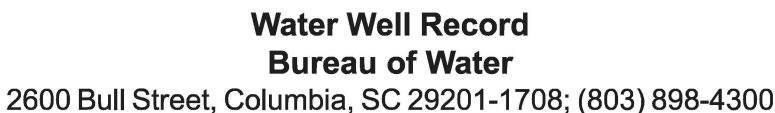
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SCALE:	1" = 40'
DRAWN BY:	JMP
CHECKED BY:	VKW
PROJECT:	06338.5000.00
SHEET:	1 / 1

## Appendix C

### Water Well Records (1903 Forms)







**7. PERMIT NUMBER:** SCD003354412

**8. USE:**

<input type="checkbox"/> Residential	<input type="checkbox"/> Public Supply	<input type="checkbox"/> Process
<input type="checkbox"/> Irrigation	<input type="checkbox"/> Air Conditioning	<input type="checkbox"/> Emergency
<input type="checkbox"/> Test Well	<input type="checkbox"/> Monitor Well	<input type="checkbox"/> Replacement

**9. WELL DEPTH** (completed) \_\_\_\_\_ ft.      Date Started: \_\_\_\_\_  
 \_\_\_\_\_ ft.      Date Completed: \_\_\_\_\_

<p><b>10. CASING:</b>   <input type="checkbox"/> Threaded   <input type="checkbox"/> Welded</p> <p>Diam.: _____</p> <p>Type:   <input type="checkbox"/> PVC   <input type="checkbox"/> Galvanized                    <input type="checkbox"/> Steel   <input type="checkbox"/> Other</p> <p>_____ in. to _____ ft. depth          _____ in. to _____ ft. depth</p>	<p>Height: Above <input type="checkbox"/> Below <input type="checkbox"/></p> <p>Surface _____ ft.</p> <p>Weight _____ lb./ft.</p> <p>Drive Shoe?   <input type="checkbox"/> Yes   <input type="checkbox"/> No</p>
--	---

**11. SCREEN:**

Type: \_\_\_\_\_ Diam.: \_\_\_\_\_

Slot/Gauge: \_\_\_\_\_ Length: \_\_\_\_\_

Set Between: \_\_\_\_\_ ft. and \_\_\_\_\_ ft.

\_\_\_\_\_ ft. and \_\_\_\_\_ ft.

Sieve Analysis ☐ Yes (please enclose) ☐ No

**NOTE: MULTIPLE SCREENS  
USE SECOND SHEET**

**12. STATIC WATER LEVEL** \_\_\_\_\_ ft. below land surface after 24 hours

**13. PUMPING LEVEL** Below Land Surface.  
 \_\_\_\_\_ ft. after \_\_\_\_\_ hrs. Pumping \_\_\_\_\_ G.P.M.  
 Pumping Test: ☐ Yes (please enclose) ☐ No  
 Yield: \_\_\_\_\_

**14. WATER QUALITY**

Chemical Analysis ☐ Yes ☐ No      Bacterial Analysis ☐ Yes ☐ No

Please enclose lab results.

15. **ARTIFICIAL FILTER** (filter pack) ☐ Yes ☐ No

Installed from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

Effective size \_\_\_\_\_ Uniformity Coefficient \_\_\_\_\_

16. WELL GROUTED? ☐ Yes ☐ No  
☐ Neat Cement ☐ Bentonite ☐ Bentonite/Cement ☐ Other \_\_\_\_\_  
 Depth: From \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

17. NEAREST SOURCE OF POSSIBLE CONTAMINATION: \_\_\_\_\_ ft. \_\_\_\_\_ direction  
Type \_\_\_\_\_  
Well Disinfected ☐ Yes ☒ No Type: \_\_\_\_\_ Amount: \_\_\_\_\_

**18. PUMP:** Date installed: \_\_\_\_\_ Not installed ☐  
Mfr. Name: \_\_\_\_\_ Model No.: \_\_\_\_\_  
H.P. \_\_\_\_\_ Volts \_\_\_\_\_ Length of drop pipe \_\_\_\_\_ ft. Capacity \_\_\_\_\_ gpm  
TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine  
☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

**19. WELL DRILLER:** Terry R. Creasman Jr.  
Address: (Print) Two United Way  
Greenville, SC 29607

**CERT. NO.:** 2116  
Level: A B C D (circle one)  
☐ ☐ ☐ ☒

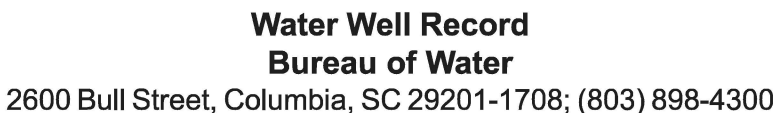
Telephone No.: 864-288-1986 Fax No.: 864-288-2272

**20. WATER WELL DRILLER'S CERTIFICATION:** This well was drilled under my direction and this report is true to the best of my knowledge and belief.

Signed: AK [Signature] Jr Date: 12-8-16  
Well Driller

If D Level Driller, provide supervising driller's name:  
William Barnes. #562-A

6. TYPE: ☐ Mud Rotary ☐ Jetted ☐ Bored  
☐ Dug ☐ Air Rotary ☐ Driven  
☐ Cable tool ☐ Other



**7. PERMIT NUMBER:** SCD003354412

**8. USE:**

<input type="checkbox"/> Residential	<input type="checkbox"/> Public Supply	<input type="checkbox"/> Process
<input type="checkbox"/> Irrigation	<input type="checkbox"/> Air Conditioning	<input type="checkbox"/> Emergency
<input type="checkbox"/> Test Well	<input type="checkbox"/> Monitor Well	<input type="checkbox"/> Replacement

**9. WELL DEPTH** (completed) \_\_\_\_\_ ft.      Date Started: \_\_\_\_\_  
 \_\_\_\_\_ ft.      Date Completed: \_\_\_\_\_

<b>10. CASING:</b> <input type="checkbox"/> Threaded <input type="checkbox"/> Welded Diam.: _____ Type: <input type="checkbox"/> PVC <input type="checkbox"/> Galvanized <input type="checkbox"/> Steel <input type="checkbox"/> Other _____ in. to _____ ft. depth _____ in. to _____ ft. depth	Height: Above <input type="checkbox"/> Below <input type="checkbox"/> Surface _____ ft. Weight _____ lb./ft. Drive Shoe? <input type="checkbox"/> Yes <input type="checkbox"/> No
---	--

**11. SCREEN:**

Type: \_\_\_\_\_ Diam.: \_\_\_\_\_

Slot/Gauge: \_\_\_\_\_ Length: \_\_\_\_\_

Set Between: \_\_\_\_\_ ft. and \_\_\_\_\_ ft.

\_\_\_\_\_ ft. and \_\_\_\_\_ ft.

Sieve Analysis ☐ Yes (please enclose) ☐ No

**NOTE: MULTIPLE SCREENS  
USE SECOND SHEET**

**12. STATIC WATER LEVEL** \_\_\_\_\_ ft. below land surface after 24 hours

**13. PUMPING LEVEL** Below Land Surface.  
 \_\_\_\_\_ ft. after \_\_\_\_\_ hrs. Pumping \_\_\_\_\_ G.P.M.  
 Pumping Test: ☐ Yes (please enclose) ☐ No  
 Yield: \_\_\_\_\_

**14. WATER QUALITY**

Chemical Analysis ☐ Yes ☐ No      Bacterial Analysis ☐ Yes ☐ No

Please enclose lab results.

15. **ARTIFICIAL FILTER** (filter pack) ☐ Yes ☐ No

Installed from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

Effective size \_\_\_\_\_ Uniformity Coefficient \_\_\_\_\_

16. WELL GROUTED? ☐ Yes ☐ No  
☐ Neat Cement ☐ Bentonite ☐ Bentonite/Cement ☐ Other \_\_\_\_\_  
 Depth: From \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

17. NEAREST SOURCE OF POSSIBLE CONTAMINATION: \_\_\_\_\_ ft. \_\_\_\_\_ direction  
Type \_\_\_\_\_  
Well Disinfected ☐ Yes ☒ No Type: \_\_\_\_\_ Amount: \_\_\_\_\_

**18. PUMP:** Date installed: \_\_\_\_\_ Not installed ☐  
Mfr. Name: \_\_\_\_\_ Model No.: \_\_\_\_\_  
H.P. \_\_\_\_\_ Volts \_\_\_\_\_ Length of drop pipe \_\_\_\_\_ ft. Capacity \_\_\_\_\_ gpm  
TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine  
☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

**19. WELL DRILLER:** Terry R. Creasman Jr.  
Address: (Print) Two United Way  
Greenville, SC 29607

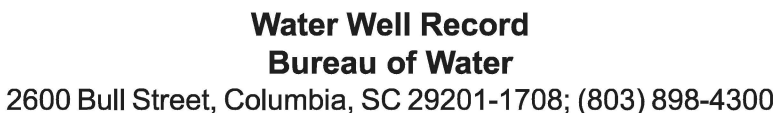
**CERT. NO.:** 2116  
Level: A B C D (circle one)  
☐ ☐ ☐ ☒

Telephone No.: 864-288-1986 Fax No.: 864-288-2272

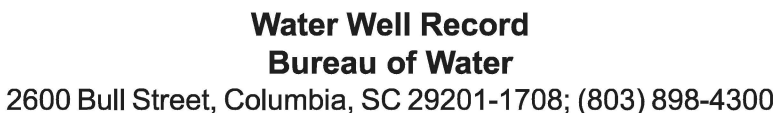
**20. WATER WELL DRILLER'S CERTIFICATION:** This well was drilled under my direction and this report is true to the best of my knowledge and belief.

Signed: Walt Driller Date: 12-8-16

If D Level Driller, provide supervising driller's name:  
William Barnes. #562-A



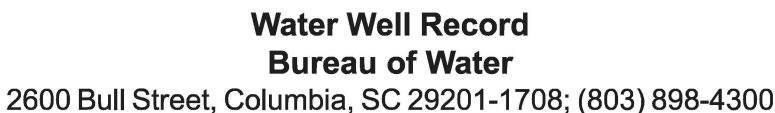
**COPY 1 MAIL TO: S.C. DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL (ADDRESS ABOVE)**



**COPY 1 MAIL TO: S.C. DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL (ADDRESS ABOVE)**







**7. PERMIT NUMBER:** SCD003354412

**8. USE:**

<input type="checkbox"/> Residential	<input type="checkbox"/> Public Supply	<input type="checkbox"/> Process
<input type="checkbox"/> Irrigation	<input type="checkbox"/> Air Conditioning	<input type="checkbox"/> Emergency
<input type="checkbox"/> Test Well	<input type="checkbox"/> Monitor Well	<input type="checkbox"/> Replacement

**9. WELL DEPTH** (completed) \_\_\_\_\_ ft.      Date Started: \_\_\_\_\_  
 \_\_\_\_\_ ft.      Date Completed: \_\_\_\_\_

<p><b>10. CASING:</b>   <input type="checkbox"/> Threaded   <input type="checkbox"/> Welded</p> <p>Diam.: _____</p> <p>Type:   <input type="checkbox"/> PVC   <input type="checkbox"/> Galvanized                    <input type="checkbox"/> Steel   <input type="checkbox"/> Other</p> <p>_____ in. to _____ ft. depth</p> <p>_____ in. to _____ ft. depth</p>	<p>Height: Above <input type="checkbox"/> Below <input type="checkbox"/></p> <p>Surface _____ ft.</p> <p>Weight _____ lb./ft.</p> <p>Drive Shoe?   <input type="checkbox"/> Yes   <input type="checkbox"/> No</p>
--	---

**11. SCREEN:**

Type: \_\_\_\_\_ Diam.: \_\_\_\_\_

Slot/Gauge: \_\_\_\_\_ Length: \_\_\_\_\_

Set Between: \_\_\_\_\_ ft. and \_\_\_\_\_ ft.

\_\_\_\_\_ ft. and \_\_\_\_\_ ft.

Sieve Analysis ☐ Yes (please enclose) ☐ No

**NOTE: MULTIPLE SCREENS  
USE SECOND SHEET**

**12. STATIC WATER LEVEL** \_\_\_\_\_ ft. below land surface after 24 hours

**13. PUMPING LEVEL** Below Land Surface.  
 \_\_\_\_\_ ft. after \_\_\_\_\_ hrs. Pumping \_\_\_\_\_ G.P.M.  
 Pumping Test: ☐ Yes (please enclose) ☐ No  
 Yield: \_\_\_\_\_

**14. WATER QUALITY**

Chemical Analysis ☐ Yes ☐ No      Bacterial Analysis ☐ Yes ☐ No

Please enclose lab results.

15. **ARTIFICIAL FILTER** (filter pack) ☐ Yes ☐ No

Installed from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

Effective size \_\_\_\_\_ Uniformity Coefficient \_\_\_\_\_

16. WELL GROUTED? ☐ Yes ☐ No  
☐ Neat Cement ☐ Bentonite ☐ Bentonite/Cement ☐ Other \_\_\_\_\_  
 Depth: From \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

17. NEAREST SOURCE OF POSSIBLE CONTAMINATION: \_\_\_\_\_ ft. \_\_\_\_\_ direction  
Type \_\_\_\_\_  
Well Disinfected ☐ Yes ☐ No Type: \_\_\_\_\_ Amount: \_\_\_\_\_

**18. PUMP:** Date installed: \_\_\_\_\_ Not installed ☐  
Mfr. Name: \_\_\_\_\_ Model No.: \_\_\_\_\_  
H.P. \_\_\_\_\_ Volts \_\_\_\_\_ Length of drop pipe \_\_\_\_\_ ft. Capacity \_\_\_\_\_ gpm  
TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine  
☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

19. **WELL DRILLER:** Terry R. Creasman Jr.  
Address: (Print) Two United Way  
Greenville, SC 29607

**CERT. NO.:** 2116  
Level: A B C D (circle one)  
☐ ☐ ☐ ☒

Telephone No.: 864-288-1986 Fax No.: 864-288-2272

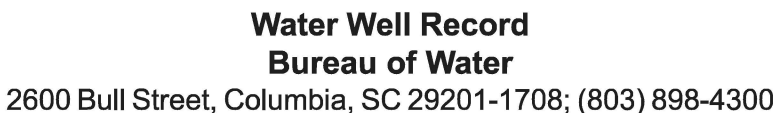
**20. WATER WELL DRILLER'S CERTIFICATION:** This well was drilled under my direction and this report is true to the best of my knowledge and belief.

Signed: Frank J. [Signature] Date: 12-8-16  
Wall Driller

If D Level Driller, provide supervising driller's name:

William Barnes. #562-A

6. TYPE: ☐ Mud Rotary ☐ Jetted ☐ Bored  
☐ Dug ☐ Air Rotary ☐ Driven  
☐ Cable tool ☐ Other



**7. PERMIT NUMBER:** SCD003354412

**8. USE:**

<input type="checkbox"/> Residential	<input type="checkbox"/> Public Supply	<input type="checkbox"/> Process
<input type="checkbox"/> Irrigation	<input type="checkbox"/> Air Conditioning	<input type="checkbox"/> Emergency
<input type="checkbox"/> Test Well	<input type="checkbox"/> Monitor Well	<input type="checkbox"/> Replacement

**9. WELL DEPTH** (completed) \_\_\_\_\_ ft.      Date Started: \_\_\_\_\_  
Date Completed: \_\_\_\_\_

**10. CASING:** ☐ Threaded ☐ Welded

Diam.: \_\_\_\_\_

Type: ☐ PVC ☐ Galvanized  
☐ Steel ☐ Other

\_\_\_\_\_ in. to \_\_\_\_\_ ft. depth  
 \_\_\_\_\_ in. to \_\_\_\_\_ ft. depth

Height: Above ☐ Below ☐

Surface \_\_\_\_\_ ft.

Weight \_\_\_\_\_ lb./ft.

Drive Shoe? ☐ Yes ☐ No

**11. SCREEN:**

Type: \_\_\_\_\_ Diam.: \_\_\_\_\_

Slot/Gauge: \_\_\_\_\_ Length: \_\_\_\_\_

Set Between: \_\_\_\_\_ ft. and \_\_\_\_\_ ft.

\_\_\_\_\_ ft. and \_\_\_\_\_ ft.

Sieve Analysis ☐ Yes (please enclose) ☐ No

**NOTE: MULTIPLE SCREENS  
USE SECOND SHEET**

**12. STATIC WATER LEVEL** \_\_\_\_\_ ft. below land surface after 24 hours

**13. PUMPING LEVEL** Below Land Surface.  
 \_\_\_\_\_ ft. after \_\_\_\_\_ hrs. Pumping \_\_\_\_\_ G.P.M.  
 Pumping Test: ☐ Yes (please enclose) ☐ No  
 Yield: \_\_\_\_\_

**14. WATER QUALITY**

Chemical Analysis ☐ Yes ☐ No      Bacterial Analysis ☐ Yes ☐ No

Please enclose lab results.

15. **ARTIFICIAL FILTER** (filter pack) ☐ Yes ☐ No

Installed from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

Effective size \_\_\_\_\_ Uniformity Coefficient \_\_\_\_\_

16. WELL GROUTED? ☐ Yes ☐ No  
☐ Neat Cement ☐ Bentonite ☐ Bentonite/Cement ☐ Other \_\_\_\_\_  
 Depth: From \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

17. NEAREST SOURCE OF POSSIBLE CONTAMINATION: \_\_\_\_\_ ft. \_\_\_\_\_ direction  
Type \_\_\_\_\_  
Well Disinfected ☐ Yes ☒ No Type: \_\_\_\_\_ Amount: \_\_\_\_\_

**18. PUMP:** Date installed: \_\_\_\_\_ Not installed ☐  
Mfr. Name: \_\_\_\_\_ Model No.: \_\_\_\_\_  
H.P. \_\_\_\_\_ Volts \_\_\_\_\_ Length of drop pipe \_\_\_\_\_ ft. Capacity \_\_\_\_\_ gpm  
TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine  
☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

**19. WELL DRILLER:** Terry R. Creasman Jr.  
Address: (Print) Two United Way  
Greenville, SC 29607

**CERT. NO.:** 2116  
Level: A B C D (circle one)  
☐ ☐ ☐ ☒

Telephone No.: 864-288-1986 Fax No.: 864-288-2272

**20. WATER WELL DRILLER'S CERTIFICATION:** This well was drilled under my direction and this report is true to the best of my knowledge and belief.

Signed: Frank [Signature] Date: 12-8-16  
Wall Driller

If D Level Driller, provide supervising driller's name:

William Barnes. #562-A

6. TYPE: ☐ Mud Rotary ☐ Jetted ☐ Bored  
☐ Dug ☐ Air Rotary ☐ Driven  
☐ Cable tool ☐ Other



Appendix D  
Laboratory Analytical Data for  
Soil Waste Characterization Samples  
(on CD)

Appendix E  
Profiles, Manifest Log, and Manifests  
(on CD)

Appendix F  
Permit to Construct and  
As-Built Drawings for Injection  
Galleries INJ-D-01 and INJ-D-02



February 22, 2017

Mr. Virgilio Cocianni  
Schlumberger Technology Corporation  
121 Industrial Blvd.  
Sugarland, TX 77478

Re: Underground Injection Control Permit #SCHE03020417M5  
Area D Sangamo Westin/Twelvemile Creek/Lake Hartwell Superfund: OU #1- Plant site Site  
Pickens County

Dear Mr. Cocianni:

Enclosed is a Permit to Construct for three (3) infiltration galleries (INJ-D-01, INJ-D-02 and INJ-D-03) Class V.A.-I injection wells at the Area D Sangamo Westin/Twelvemile Creek/Lake Hartwell Superfund: OU #1- Plant site Site, Pickens County as requested in the permit application received February 21, 2017.

**South Carolina Board of Health and Environmental Control**  
**Guide to Board Review**  
**Pursuant to S.C. Code Ann. § 44-1-60**  
**Effective April 1, 2013**

The decision of the South Carolina Department of Health and Environmental Control (Department) becomes the final agency decision fifteen (15) calendar days after notice of the decision has been mailed to the applicant, permittee, licensee and affected persons who have requested in writing to be notified, unless a written request for final review accompanied by a filing fee in the amount of \$100 is filed with Department by the applicant, permittee, licensee or affected person.

Applicants, permittees, licensees, and affected parties are encouraged to engage in mediation during the final review process.

If the Board declines in writing to schedule a final review conference, the Department's decision becomes the final agency decision and an applicant, permittee, licensee, or affected person may request a contested case hearing before the Administrative Law Court within thirty (30) calendar days after notice is mailed that the Board declined to hold a final review conference.

**I. Filing of Request for Final Review**

1. A written Request for Final Review (RFR) and the required filing fee of one hundred dollars (\$100) must be received by Clerk of the Board within fifteen (15) calendar days after notice of the staff decision has been mailed to the applicant, permittee, licensee, or affected persons. If the 15<sup>th</sup> day occurs on a weekend or State holiday, the RFR must be received by the Clerk on the next working day. RFRs will not be accepted after 5:00 p.m.
2. RFRs shall be in writing and should include, at a minimum, the following information:
  - The grounds for amending, modifying, or rescinding the staff decision;
  - a statement of any significant issues or factors the Board should consider in deciding how to handle the matter;
  - the relief requested; and
  - a copy of the decision for which review is requested.

3. RFRs should be filed in person or by mail at the following address:

South Carolina Board of Health and Environmental Control

Attention: Clerk of the Board

2600 Bull Street

Columbia, South Carolina 29201

Alternatively, RFR's may be filed with the Clerk by facsimile (803-898-3393) or by electronic mail (boardclerk@dhec.sc.gov).

4. The filing fee may be paid by cash, certified check or credit card. If a RFR is filed by facsimile or electronic mail, the filing fee may be mailed to the Clerk of the Board and the envelope must be postmarked within the time allowed for filing a RFR.
5. If there is any perceived discrepancy in compliance with this RFR filing procedure, the Clerk should consult with the Chairman or, if the Chairman is unavailable, the Vice-Chairman. The Chairman or the Vice-Chairman will determine whether the RFR is timely and properly filed and direct the Clerk to (1) process the RFR for consideration by the Board or (2) return the RFR and filing fee to the requestor with a cover letter explaining why the RFR was not timely or properly filed. Processing an RFR for consideration by the Board shall not be interpreted as a waiver of any claim or defense by the agency in subsequent proceedings concerning the RFR.
6. If the RFR will be processed for Board consideration, the Clerk will send an Acknowledgement of RFR to the Requestor and the applicant, permittee, or licensee, if other than the Requestor.
7. The Clerk will email the RFR to all Board members for review, and all Board members will confirm receipt of the RFR to the Clerk by email. If a Board member does not confirm receipt of the RFR within twenty-four (24) hour period, the Clerk will contact the Board member and confirm receipt. If a Board member believes the RFR should be considered by the RFR Committee, he or she will respond to the Clerk's email within forty-eight (48) hours and will request further review. If no Board member requests further review of the RFR within the forty-eight (48) hour period, the Clerk will send a letter by certified mail to the Requestor, with copy by regular mail to the applicant, permittee, or licensee, if not the Requestor, stating the Board will not hold a Final Review Conference. A copy of the Notice of Appeal Procedure will be included with the letter.

*NOTE: If the time periods described above end on a weekend or State holiday, the time is automatically extended to 5:00 p.m. on the next business day.*

8. If the RFR is to be considered by the RFR Committee, the Clerk will forward a copy of the RFR to Department staff and Office of General Counsel. A Department response to the RFR should be provided by Department staff to the Clerk within eight (8) working days after the RFR is forwarded.

## **II. Final Review Conference Scheduling**

1. If a Conference will be held, the Clerk will send a letter by certified mail to the Requestor, with copy by regular mail to the applicant, permittee, or licensee, if not the Requestor, informing the Requestor of the determination.
2. The Clerk will request Department staff provide the Administrative Record.
3. The Clerk will send Notice of Final Review Conference to the parties at least ten (10) days before the Conference. The Conference will be publicly noticed and should:
  - include the place, date and time of the Conference;
  - state the presentation times allowed in the Conference;
  - state evidence may be presented at the Conference;
  - if the conference will be held by committee, include a copy of the Chairman's order appointing the committee; and
  - inform the Requestor of his or her right to request a transcript of the proceedings of the Conference prepared at Requestor's expense.
4. If a party requests a transcript of the proceedings of the Conference and agrees to pay all related costs in writing, including costs for the transcript, the Clerk will schedule a court reporter for the Conference.



### III. Final Review Conference and Decision

I. The order of presentation in the Conference will, subject to the presiding officer's discretion, be as follows:

- Department staff will provide an overview of the staff decision and the applicable law to include [10 minutes]:
  - Type of decision (permit, enforcement, etc.) and description of the program.
  - Parties
  - Description of facility/site
  - Applicable statutes and regulations
  - Decision and materials relied upon in the administrative record to support the staff decision.
- Requestor(s) will state the reasons for protesting the staff decision and may provide evidence to support amending, modifying, or rescinding the staff decision. [15 minutes] *NOTE: The burden of proof is on the Requestor(s)*
- Rebuttal by Department staff[15 minutes]
- Rebuttal by Requestor(s)[10 minutes]

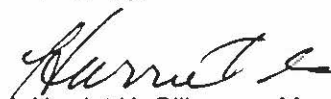
Note: Times noted in brackets are for information only and are superseded by times stated in the Notice of Final Review Conference or by the presiding officer.

2. Parties may present evidence during the conference; however, the rules of evidence do not apply.
3. At any time during the conference, the officers conducting the conference may request additional information and may question the Requestor, the staff, and anyone else providing information at the conference.
4. The presiding officer, in his or her sole discretion, may allow additional time for presentations and may impose time limits on the Conference.
5. All Conferences are open to the public.
6. The officers may deliberate in closed session.
7. The officers may announce the decision at conclusion of the Conference or it may be reserved for consideration.
8. The Clerk will mail the written final agency decision (FAD) to parties within 30 days after the Conference. The written decision must explain the basis for the decision and inform the parties of their right to request a contested case hearing before the Administrative Law Court. The FAD will be sent by certified mail, return receipt requested.
9. Communications may also be sent by electronic mail, in addition to the forms stated herein, when electronic mail addresses are provided to the Clerk.

**The above information is provided as a courtesy; parties are responsible for complying with all applicable legal requirements.**

Please submit all of the well logs for the installed wells to schedule a well inspection. An inspection of the UIC System must be conducted prior to issuance of the Permit to Operate. If you have any questions, please call Bruce Crawford at (803) 898-4177.

Sincerely,



Harriet H. Gilkerson, Manager  
Water Quantity Permitting Section  
SCDHEC - Bureau of Water

cc: Craig Zeller, USEPA, Region 4, 61 Forsyth St., SW, Atlanta, GA 30303-3104  
Susan Fulmer, SCDHEC-BLWM



## WATER MONITORING ASSESSMENT & PROTECTION DIVISION

Injection Well Construction Permit  
for  
Class II, III, and V.A. Injection Well(s)

Permit #SCHE03020417M5

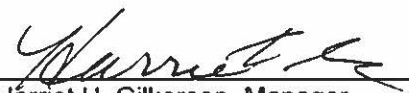
Date Issued: February 22, 2017  
Date Expired: February 22, 2018

For (Operator): Schlumberger Technology Corporation

In accordance with R.61-72 this permit will become final unless it is appealed within fifteen (15) days of the issuance date.

In accordance with provisions of Title 48, Chapter 1, South Carolina Code of Laws, 1976, as amended, permission is granted for construction of three (3) infiltration galleries (INJ-D-01, INJ-D-02 and INJ-D-03) Class V.A.-I injection wells with a true diameter of four (4) inches, and a total depth of approximately up to thirty-five (35) feet by fifty (50) feet in length located at Area D Sangamo Westin/Twelvemile Creek/Lake Hartwell Superfund: OU #1- Plant site, Pickens County, SC with the following provisions:

- 1) The operator shall submit completed SCDHEC well record forms to the Departments Water Monitoring, Assessment & Protection Division after completion of the injection wells.
- 2) Upon completion of construction, injection activities shall not commence prior to receiving approval from the Department to operate the injection wells.
- 3) When the injection wells are no longer in use, or upon request by the Department, within sixty (60) days all injection wells must be permanently abandoned in accordance with the South Carolina Well Standards and Regulations (R.61-71).

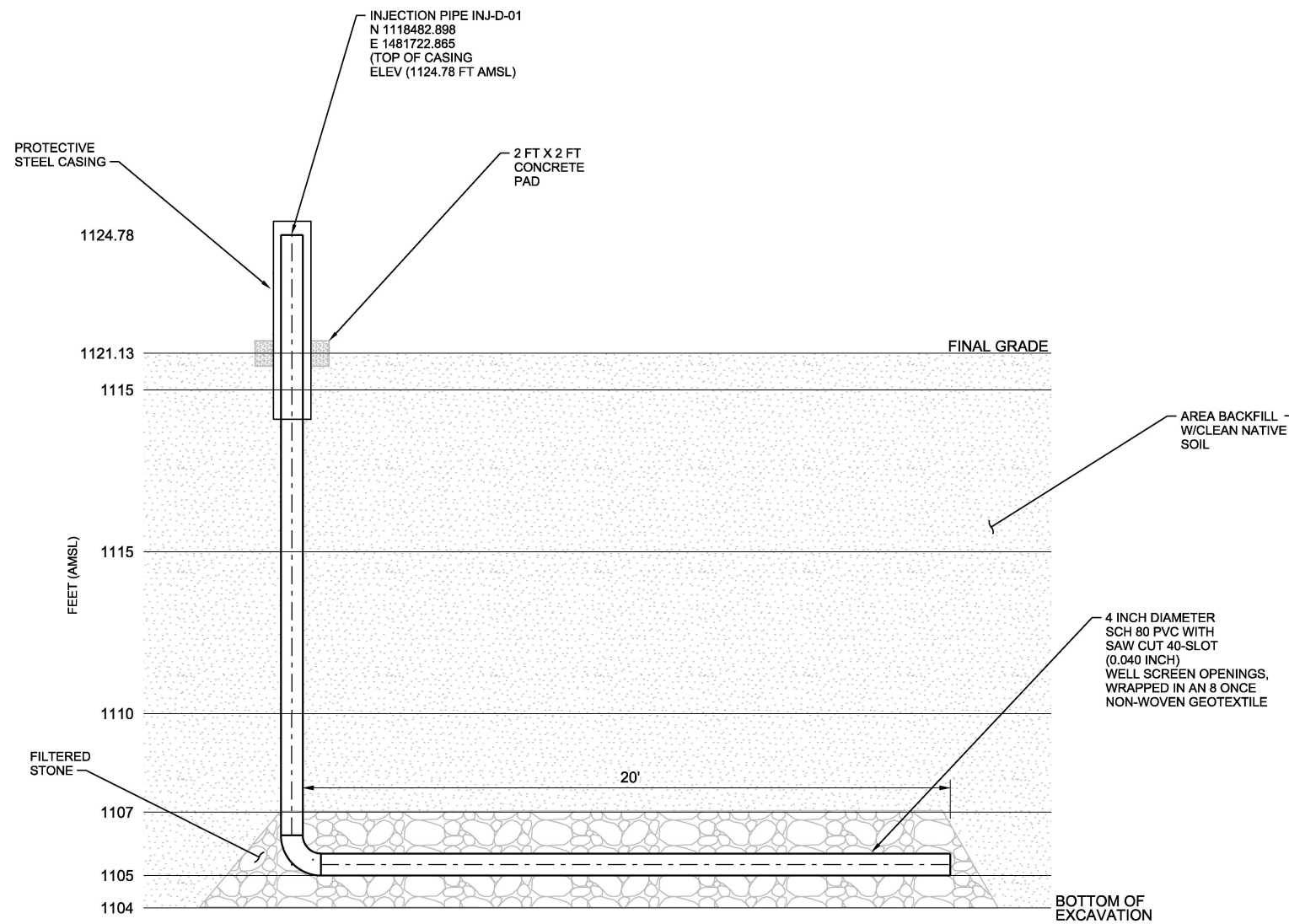
  
Harriet H. Gilkerson, Manager  
Water Quantity Permitting Section  
SCDHEC - Bureau of Water

**STATEMENT OF BASIS - UIC DRAFT PERMIT #SCHE03020417M5**

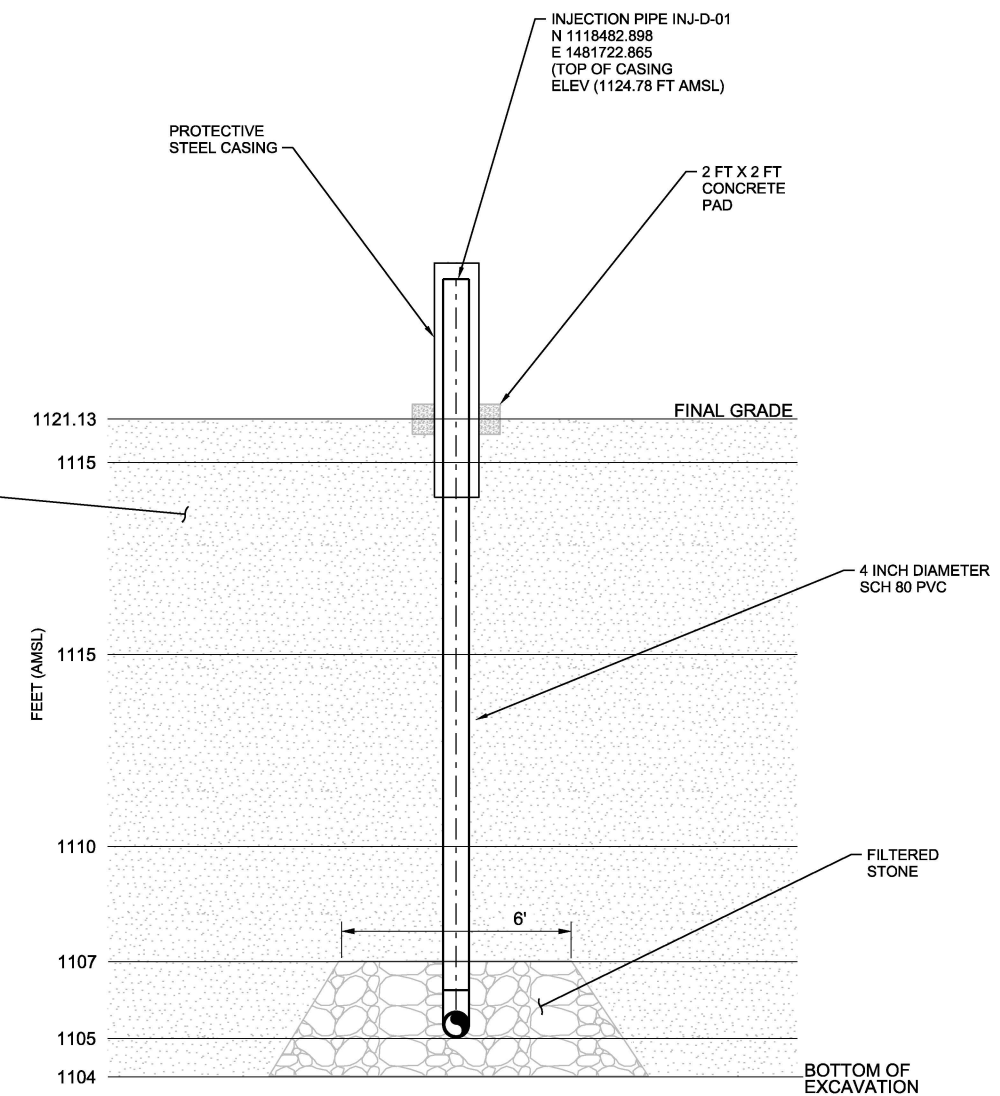
In accordance with the South Carolina Underground Injection Control Regulations, Section R61-87.13(J), this Statement of Basis has been prepared for the Area D Sangamo Westin/Twelvemile Creek/Lake Hartwell Superfund: OU #1- Plant site Site Underground Injection Control permit application received February 21, 2017.

Ownership of the proposed injection wells is Schlumberger Technology Corporation, 121 Industrial Blvd., Sugarland, TX 77478. The permit (UIC SCHE03020417M5) is for the construction of three (3) infiltration galleries (INJ-D-01, INJ-D-02 and INJ-D-03) injection wells for a corrective action system at the Area D Sangamo Westin/Twelvemile Creek/Lake Hartwell Superfund: OU #1- Plant site Site. The intent of the injection wells is to inject a potassium permanganate solution into the subsurface via horizontal wells to remediate groundwater contaminated with volatile organic compounds as described in the cleanup plan dated February 17, 2017. The final permit for the underground injection proposal has been prepared based on staff review and the application of the Pollution Control Act of South Carolina and the Underground Injection Control Regulations of South Carolina.

Conditions of the permit issuance include the submittal of well records for all injection wells installed and the inspection of well construction by the Department prior to injection.

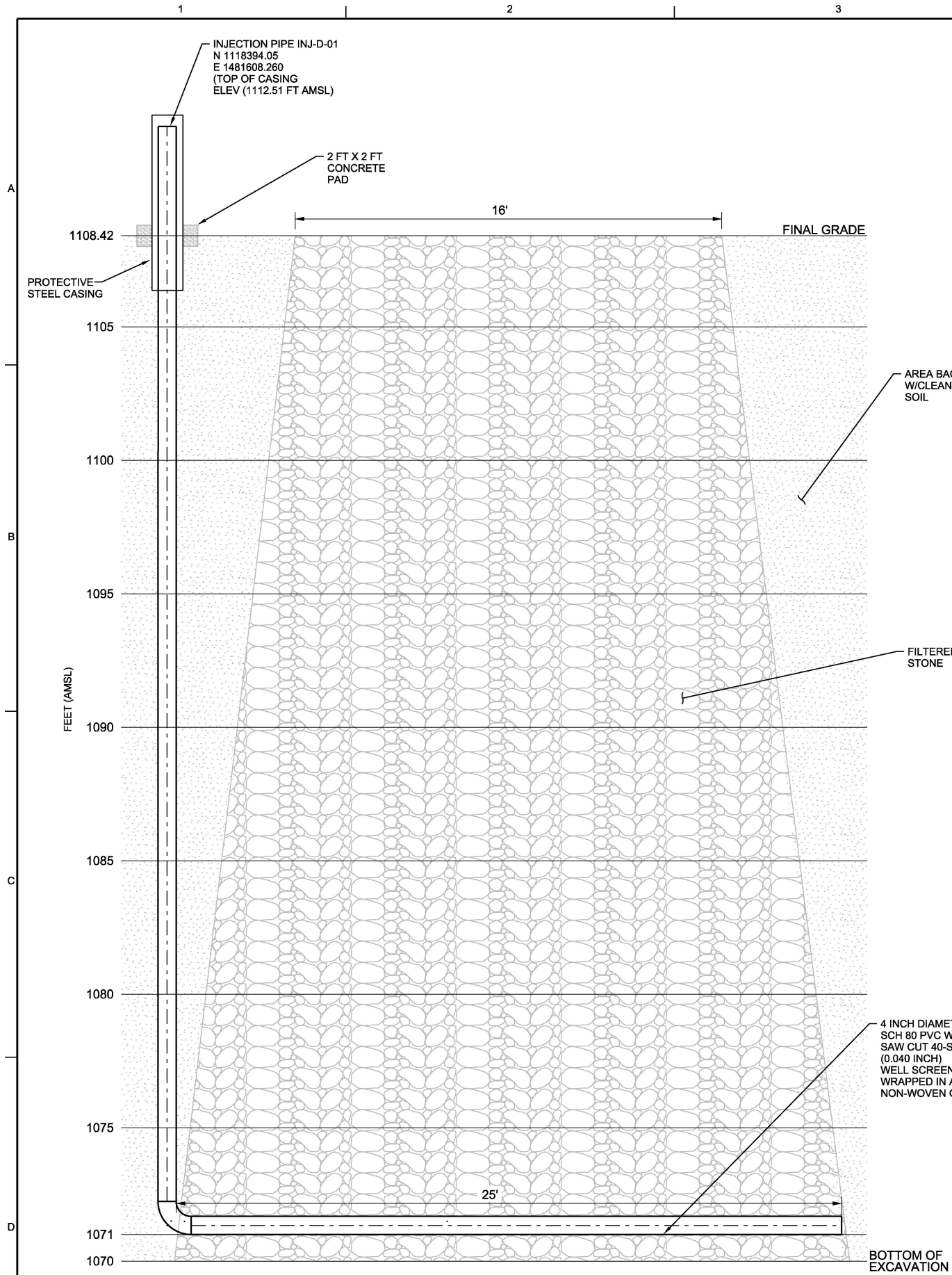


**INJ-D-01 CONSTRUCTION DETAIL**  
 HORIZ: 1" = 5'  
 VERT: 1" = 5'

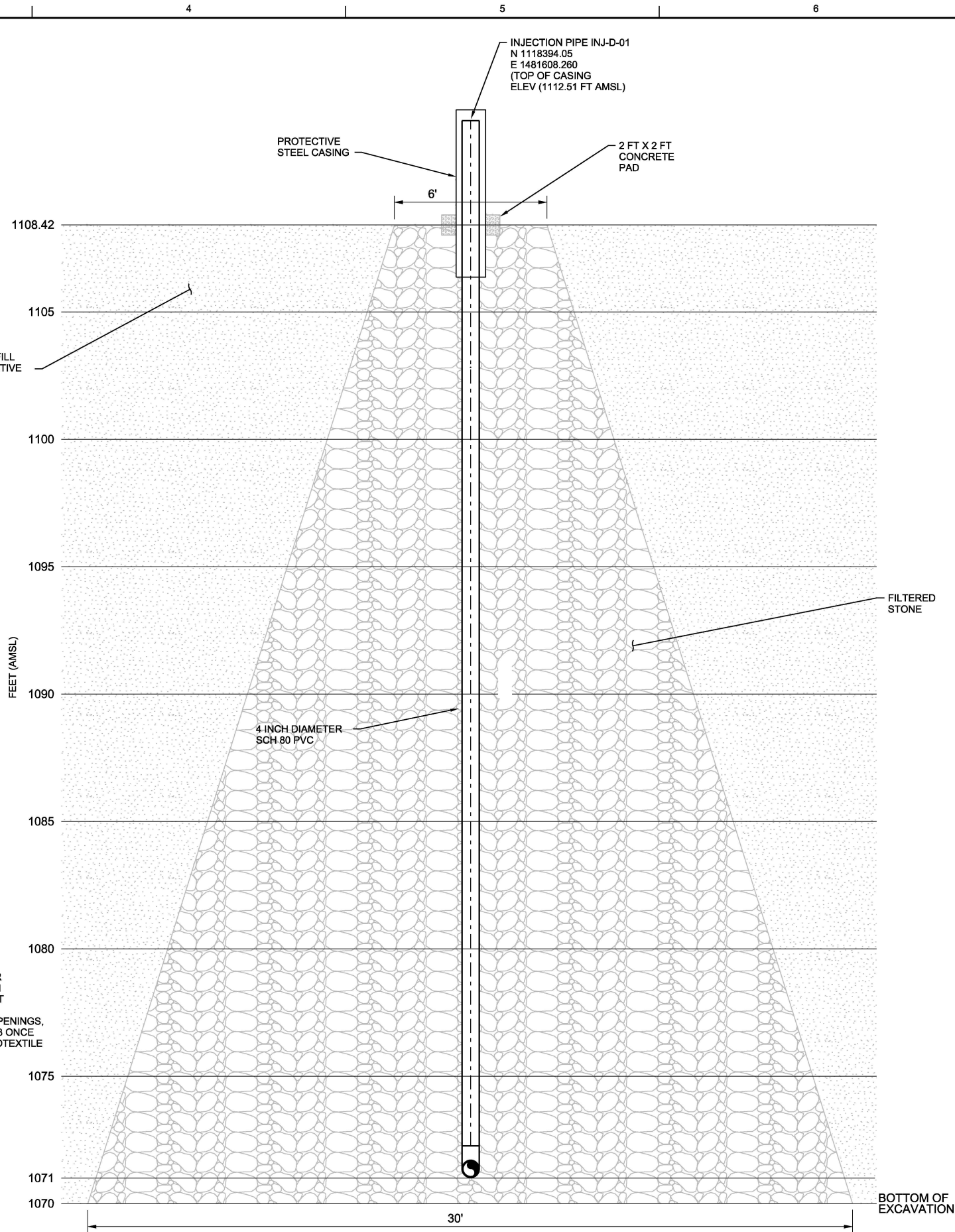


**INJ-D-01 CONSTRUCTION DETAIL**  
HORIZ: 1" = 5'  
VERT: 1" = 5'





**C** INJ-D-02 CONSTRUCTION DETAIL  
D-03  
HORIZ: 1" = 5'  
VERT: 1" = 5'



**D** INJ-D-02 CONSTRUCTION DETAIL  
D-03  
HORIZ: 1" = 5'  
VERT: 1" = 5'

**ch2m**

CIVIL  
FIGURE 2  
INJ-D-02  
AS-BUILT CONSTRUCTION DETAILS

ASBUILT SURVEY  
SANGAMO, FACILITY  
PICKENS COUNTY, PICKENS, NC

NO.	DATE	DR	REVISION		BY	APVD
			CHK	APVD		



Appendix G  
Laboratory Analytical Data for  
Wipe Samples (on CD)